COVID-19 Vaccine Hesitancy:

Two Years after the Outbreak

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Executive Summary

In the aftermath of Hurricane Harvey, which hit Houston in August 2017, the University of Houston's Hobby School of Public Affairs initiated a five-year study to understand how Houstonians and Texans respond to natural disasters. In the fourth wave of the survey, which was fielded between December 22, 2021, and March 2, 2022, we asked about respondents' experiences with COVID-19. The survey included a representative sample of Texas residents, with an over-sample of residents from the Greater Houston area. In total, 2,587 respondents aged 18 and older completed our survey. In this report, we analyze Texans' attitudes towards the COVID-19 vaccine.

As a summary of the report, we would like to emphasize the following findings:

1. About three-fifths of survey participants reported being fully vaccinated; slightly more than one-third said they were unvaccinated.

2. Vaccinated respondents used positive words and phrases when asked what comes to mind when they think about the COVID-19 vaccines, with "safe" and "good" being two of the most frequent. By contrast, those who were not vaccinated used words and phrases with negative connotations such as "no" and "not getting."

3. Participants 45 and older were more likely to be vaccinated compared to those ages 18 to 44; very little difference was reported by gender.

4. COVID-19 vaccine hesitancy is highly ideological: respondents who described themselves as conservative are the most hesitant toward the COVID-19 vaccine, while those who self-described as liberal were the least hesitant.

5. Vaccination rates among liberals was the highest, at 75.5%, followed by moderates, who reported a vaccination rate of 60%. Still, about a quarter of respondents who reported being liberal remained unvaccinated

6. Around 40% of Black and Hispanic respondents were unvaccinated compared to about one-third of White respondents. However, unvaccinated White respondents were the least willing to consider getting the vaccine: 84% compared to 72% of Black and 65% of Hispanic respondents.

7. Economic compensations and approval status of the COVID-19 vaccine reduced hesitancy. Increasing the money respondents could receive for getting the vaccine almost doubles the likelihood a unvaccinated respondent will get it in the future. Likewise, the probability almost triples when a vaccine approval status changes from experimental to fully approved.

8. Respondents relied on three primary sources of information about the COVID-19 vaccine: news networks, family, and Facebook. The sources of information differed by party identification. Republicans relied more on a single news network (23%) compared to Democrats (17%).

Introduction

Vaccine hesitancy, defined by the World Health Organization as "the reluctance or refusal to vaccinate despite the availability of vaccines," has posed a significant threat to public health in recent decades.[1] Starting in 1982 with the documentary "DPT: Vaccine Roulette", attitudes toward vaccines began to change in the US.[2] The documentary emphasized the side effect of the DPT triple vaccine (diphtheria-pertussis-tetanus). On February 2, 1998, a later retracted paper published in The Lancet connected the measles, mumps and rubella (MMR) vaccine with cases of autism among children. Years later, internet and social media have helped spread fears about vaccine safety. Today, although the scientific community has displayed an unprecedented global effort to contain the COVID-19 pandemic, vaccine hesitancy continues to hinder these efforts.

This report presents information on COVID-19 vaccine hesitancy in Texas. The results are based on a survey conducted in the State of Texas by the Hobby School of Public Affairs. The survey documents Texans' attitudes, opinions, and beliefs toward the COVID-19 vaccine, the respondents' vaccination status, their willingness to receive a COVID-19 vaccine, and their sources of information. The survey was fielded by Recon between December 22, 2021 and March 2, 2022, with 1,587 respondents from the Houston MSA area and 1,000 respondents from the rest of Texas, resulting in a confidence interval of $\pm 2.5\%$ for the Houston MSA sample, and 3.1% for the rest of Texas. The respondents were matched to a sampling frame on gender, age, ethnicity/race, and education and are representative of the adult population.

The report is organized into three sections. First, we discuss what do Texans think about the COVID-19 vaccine. In the second chapter, we answer the question of who got the COVID-19 vaccine in Texas. We analyze different levels of vaccine hesitancy by gender, race, age, and party identification. Chapter 4 also explores when respondents got the vaccine, the respondents' attitudes toward the COVID-19 vaccine booster, as well as attitudes among the unvaccinated respondents. In the third and last chapter, Information about the COVID-19 vaccine, we explore the sources from which Texans obtained information about the COVID-19 vaccine, and how this varies by race, age, and party identification.

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[1] https://sitn.hms.harvard.edu/flash/2021/vaccine-hesitancy-more-than-a-pandemic/
[2] https://www.tandfonline.com/doi/full/10.4161/hv.24657

What do Texans think about the COVID-19 Vaccine?

What does the COVID-19 vaccine mean to people? In the survey, we asked respondents for their opinion on the COVID-19 vaccine. Specifically, respondents were asked, "When you think about COVID-19 vaccines, what words come to mind?" Respondents were not constrained to particular words, nor was their response limited to a certain number of words. We used a text analysis technique that identifies the most recurrent words or phrases in their responses to analyze the answers. Figure 2.1 presents the most common words as a *word cloud*. The size of the word represents the frequency the word was used to describe the COVID-19 vaccine. The two most common words people used to describe the vaccine were "safe" and "no".

Figure 2.1: Most common words: When you think about COVID-19 vaccines, what words come to mind?

Figure 2.2 shows the ten most common words used by respondents. The most recurrent word was "safe" and its related words such as "safety," with 115 mentions. The word "safe" sometimes

appears by itself, but most often respondents used it positively ("*The vaccines safely help you build protection from COVID-19*", "*Necessary, safe, life-saving*"). The second most common word was "no" with 103 mentions. The word "no" was used most of the time with negative connotations toward the vaccine, sometimes as a simple "no", and some other times in more elaborated phrases ("*No vax mandates!*", "*No siento que sea segura la vacuna*"[1]).
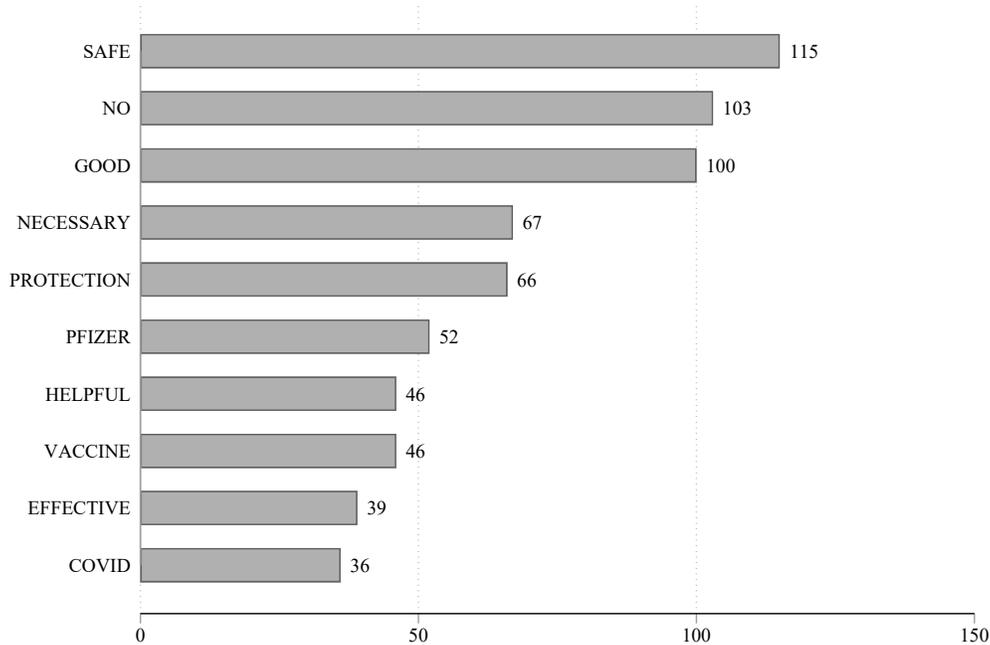

Figure 2.2: Top ten most common words (frequency)

When we examine the most frequently used words by vaccination status - whether a respondent is fully vaccinated - a different picture emerges.[2] Figure 2.3 shows these results. As expected, there is a huge contrast between those who were vaccinated and those who were not. The most common words for the vaccinated respondents were *good*, *safe*, *necessary*, and *protection*. In contrast, for the respondents who reported not being vaccinated against COVID-19, the word that appeared most frequently was *no*. Also, in the unvaccinated top ten, we see words with negative connotation such as *not getting*, *unsure*, *dangerous*, and *death*.

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[1] "I don't feel the vaccine is safe." in Spanish.

[2] Overall the frequencies for non-vaccinated respondents are much smaller because only 36.11 percent (or 934 respondents) reported not being vaccinated.
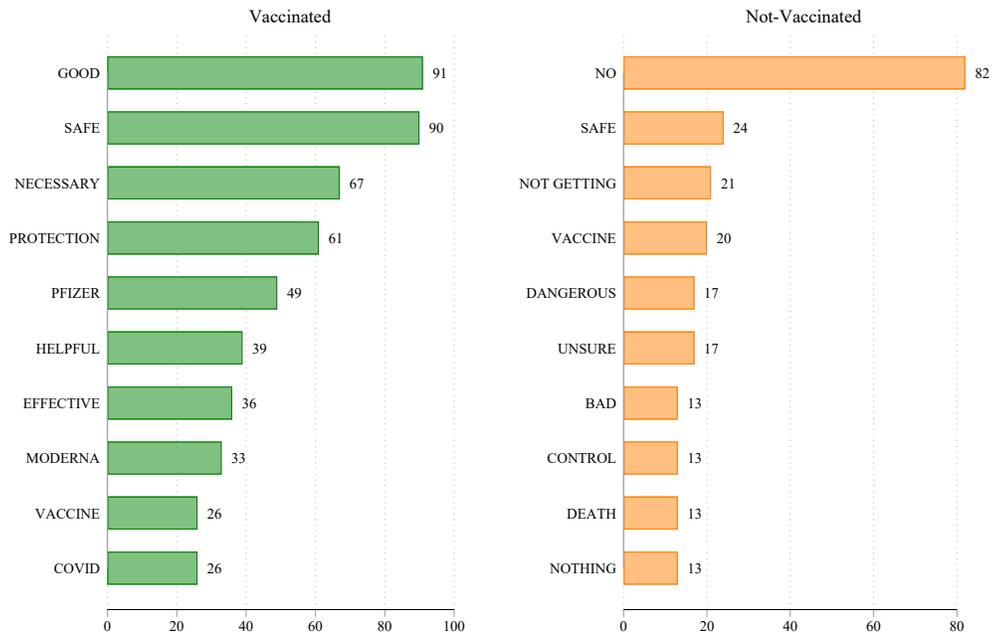
Figure 2.3: Top ten most common words by vaccination status (frequency)

Who got the COVID-19 Vaccine in Texas?

Overall, 64% of the respondents in this survey were fully vaccinated and 36% were unvaccinated (Figure 3.1). Among the vaccinated, 57.4% received the Pfizer or Moderna vaccine, whereas 6.5% received Johnson & Johnson and other vaccines. The vast majority of vaccinated respondents reported receiving the Pfizer or Moderna vaccines.
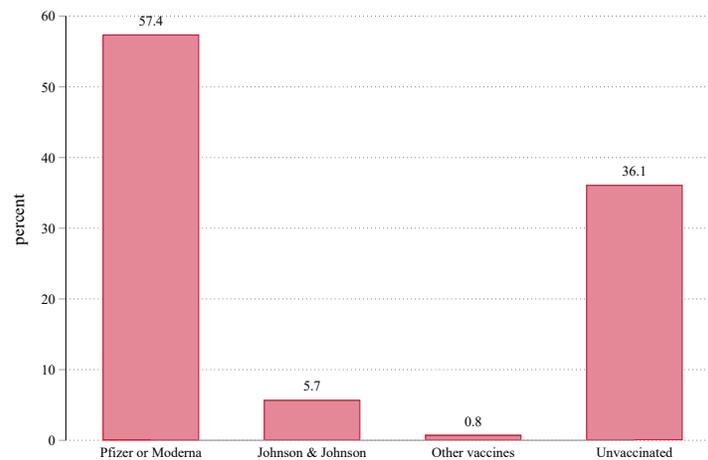

Figure 3.1: Vaccination status

We find that vaccination status varies across age, political party, and other demographic characteristics, leaving some populations particularly vulnerable. We find the highest vaccination rates among older respondents: 65.8% of adults between 45 and 64, and 80.8% of those 65 years old and above reported being vaccinated (Figure 3.2). The results also reveal the lowest vaccination rates among younger Texans. Forty-three percent of respondents between ages of 30 and 44 and 42.7% of those between the ages of 18 and 29 reported being unvaccinated.
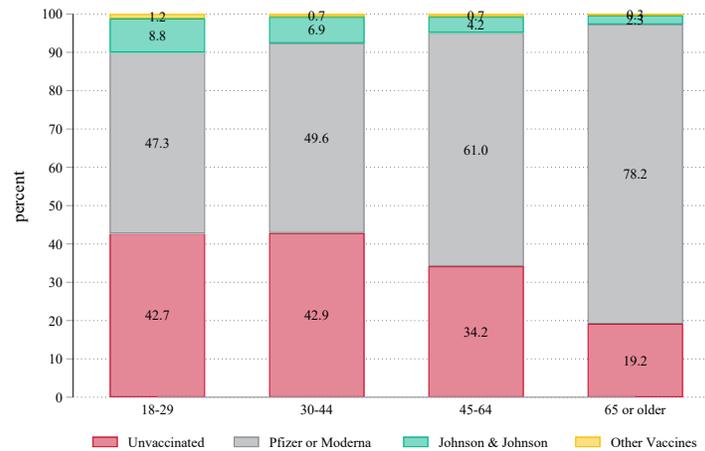
Figure 3.2: Vaccination status by age

Figure 3.3 shows only slight differences in vaccinations status by gender. Men were slightly more likely to be fully vaccinated compared to women (66.1% versus 62.5%) but the difference is not statistically significant.
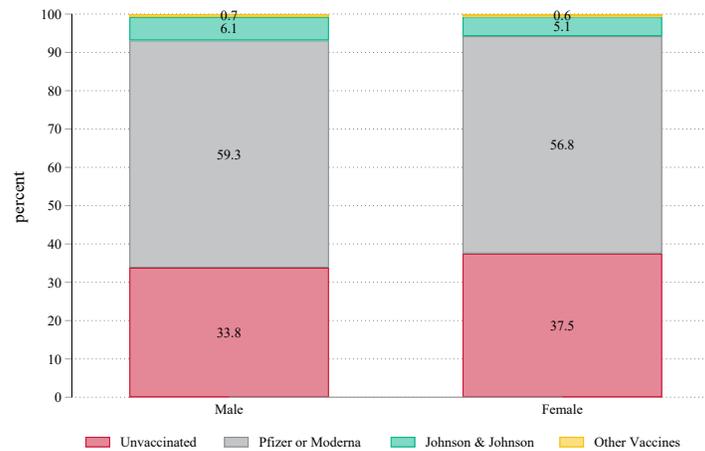

Figure 3.3: Vaccination status by gender

In Figure 3.4 we can see differences by race. We find the highest vaccination rates among White respondents (67.5%) and the lowest vaccination rates among minority communities. Approximately two-fifths of Black or African American and Hispanic or Latino(a) respondents reported not being vaccinated, a six to seven percentage point gap with White respondents.
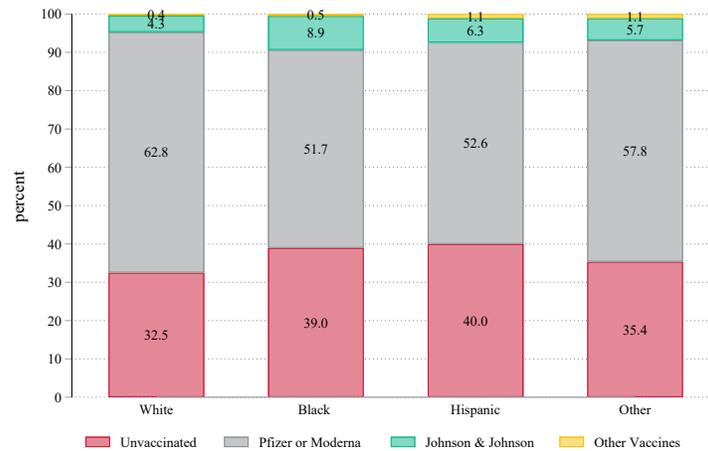
Figure 3.4: Vaccination status by race

Figure 3.5 presents statistics for vaccination status by respondents' ideology, whether they consider themselves as liberal, moderate, or conservative. Three-quarters of respondents identifying as liberal are vaccinated, compared to 60% and 57% of respondents who identify as moderate and conservative, respectively.
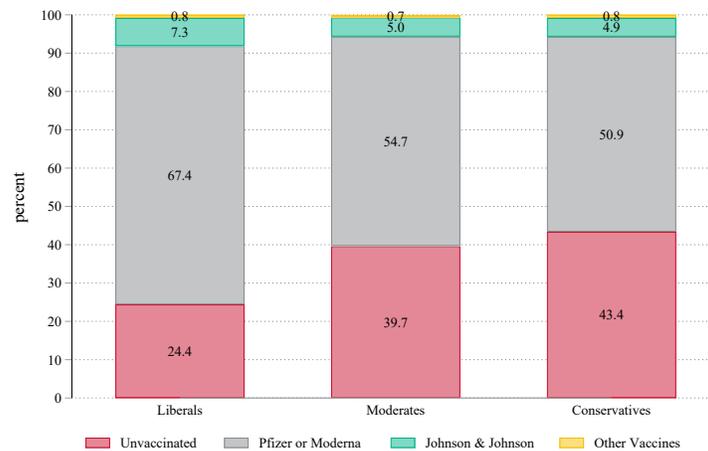

Figure 3.5: Vaccination status by ideology

Finally, we examined COVID-19 vaccination status by how often respondents reported getting the annual flu vaccine. Figure 3.6 reveals an association between the two. Among those that get the flu vaccine every year, 87% reported also getting the COVID-19 vaccine. Conversely, 66% of respondents who have never received the flu vaccine have also not received the COVID-19 vaccine. These findings show resistance to receiving the COVID-19 vaccine may be part of a larger resistance to a number of recommended vaccines rather than isolated to only the COVID-19 vaccine.
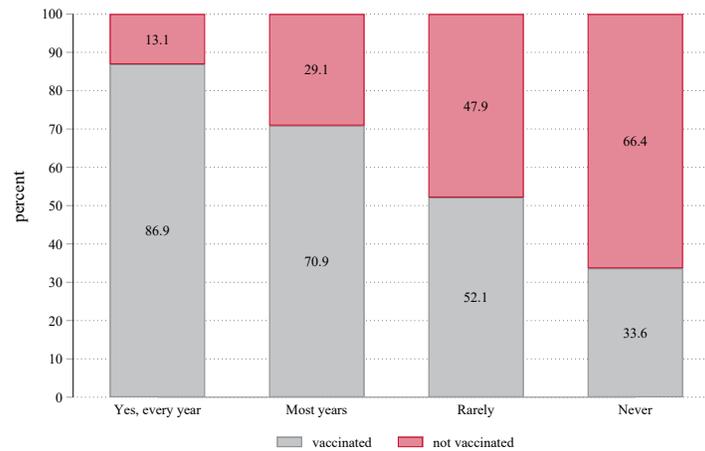
Figure 3.6: Vaccination status by flu vaccination frequency

When did Texans get their COVID-19 Vaccine

Figure 3.7 shows dates of the first dose of the COVID-19 vaccine from October 2020 to January 2022, with markers for January 2021 when the vaccines became available for people with comorbidities and May 2021, when the vaccines were available to the general public. As shown, respondents who identify as Republicans and Independents consistently expressed more hesitancy and received the vaccines at a lower rate following their widespread availability.
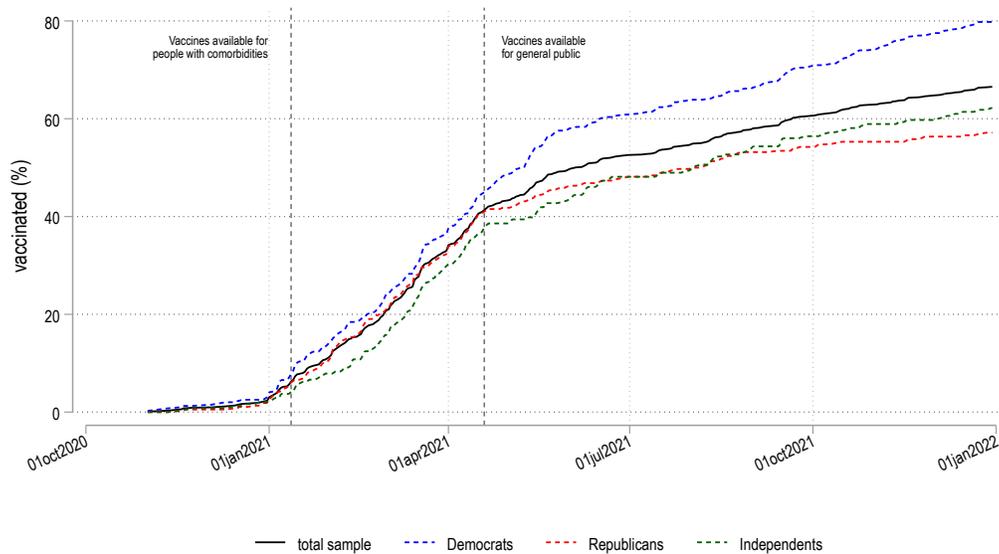

Figure 3.7: COVID-19 vaccination date by party identification (first dose)

Like the vaccination rates shown in Figure 3.2, Figure 3.8 shows that older populations were consistently the first to get vaccinated while respondents between the ages of 30 and 44 had the slowest vaccination rates. The large percentage of 65 and older respondents who received the vaccine early and at a higher rate can be attributed to the early availability of vaccinations and chronic health concerns among older respondents.
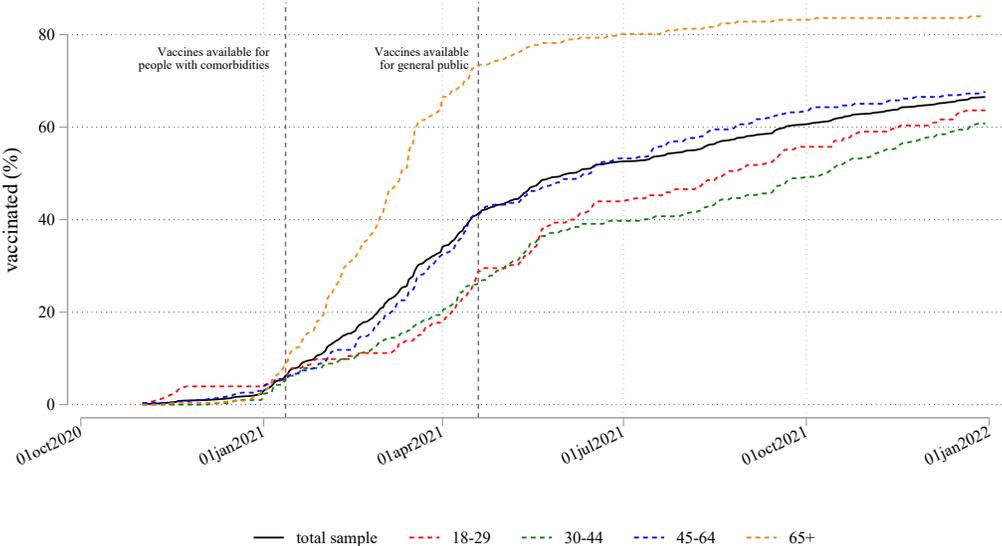

Figure 3.8: COVID-19 vaccination date by age (first dose)

Figure 3.9 shows the percentage of individuals who received an economic compensation for getting the COVID-19 vaccine by race. Black respondents were the most likely to report receiving an incentive (21.8%); however, on average, less than a fifth of respondents reported any monetary compensation in exchange for getting the vaccine.
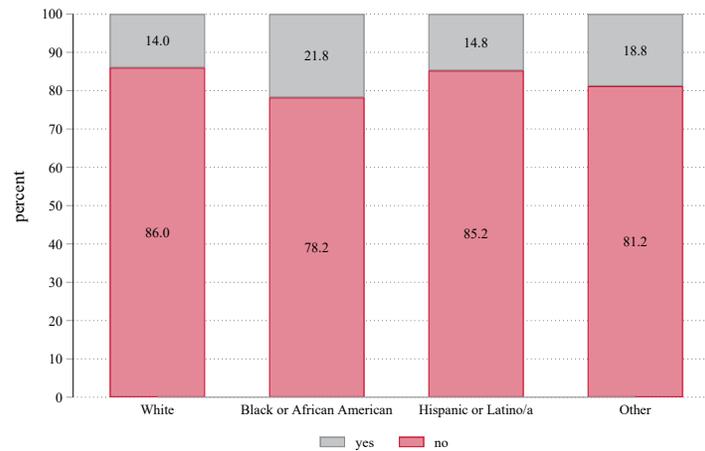
Figure 3.9: Compensated for getting the COVID-19 vaccine by race

Getting the booster

In this section, we focus on those respondents who have been fully vaccinated (either two shots of Pfizer/Moderna or one shot of Johnson & Johnson). Figure 3.10 shows that Black respondents expressed the highest rate of hesitancy for receiving a booster (22.5%). However, Black respondents, along with Hispanic respondents, were the most likely to report a willingness to receive a booster (60%) compared to White respondents (50%) and those identifying as other (52%). By contrast, White respondents are the group with the largest percentage of individuals who have received the booster (34.1%).
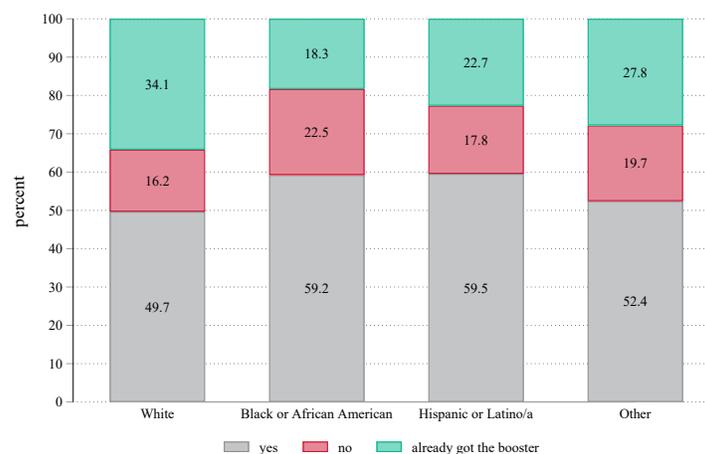

Figure 3.10: Would you get a third dose or booster of the COVID-19 vaccine? (by race)

Consistent with trends described above, Figure 3.11 shows Independents (21%) and Republicans (25.2%) as having higher rates of hesitancy for receiving a third or booster dose of the COVID-19 vaccine. Although more Republicans were unwilling to get a booster than Democrats, Republicans were slightly more likely to have already received the booster than both Democrats and Independents (30.4% vs. 27.3% and 26.3%, respectively).
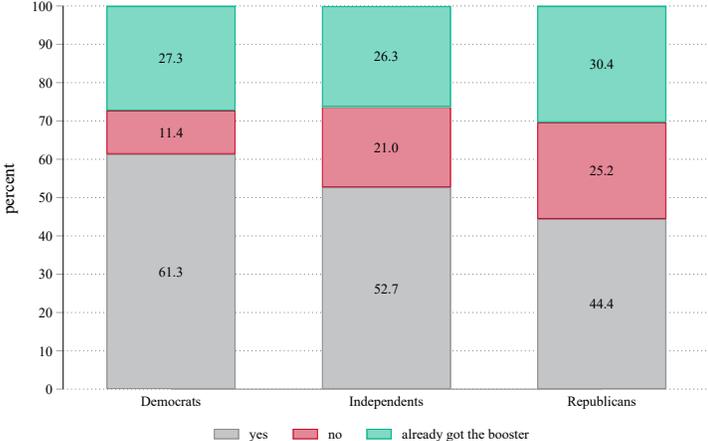

Figure 3.11: Would you get a third dose or booster of the COVID-19 vaccine? (by party)

Will the unvaccinated get the vaccine?

As previously mentioned, 36.1% of respondents in the study were unvaccinated. Among these, vaccine hesitancy is greatest among Republicans. Figure 3.12 shows that 84.3% of the Republican respondents do not plan to get the vaccine compared to 72.7% of Independents and 59.4% of Democrats. Conversely, willingness to get the vaccine among the unvaccinated is highest among Democrats at 40.6% compared to 27.3% of Independents and 15.7% of Republicans. Unvaccinated Democrats are more than twice as willing to get the vaccine in the next few months (23.2%) compared to unvaccinated Independents (7.0%) and Republicans (4.0%).
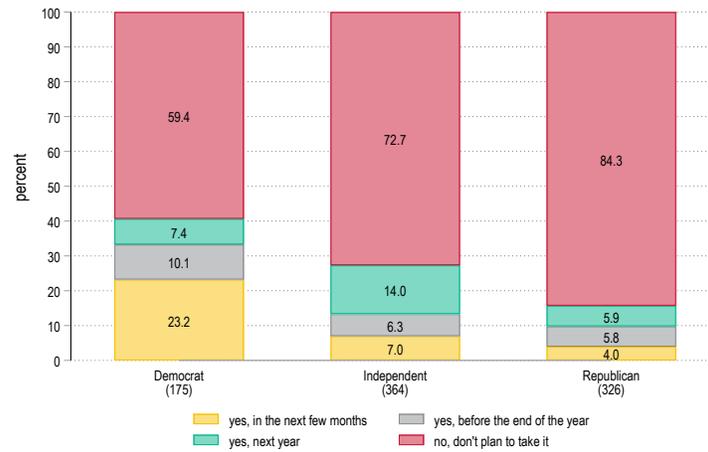
Figure 3.12: Planning to take the COVID-19 vaccine (by party)

When considering willingness to get the vaccine among the unvaccinated by race and ethnicity, the results indicate the greatest hesitancy among White respondents. Eighty-four percent of unvaccinated White respondents said they were not planning to take the vaccine, compared to 72.4% of Black, 64.7% of Hispanic, and 70.8% of those identifying with other races. (see Figure 3.13).
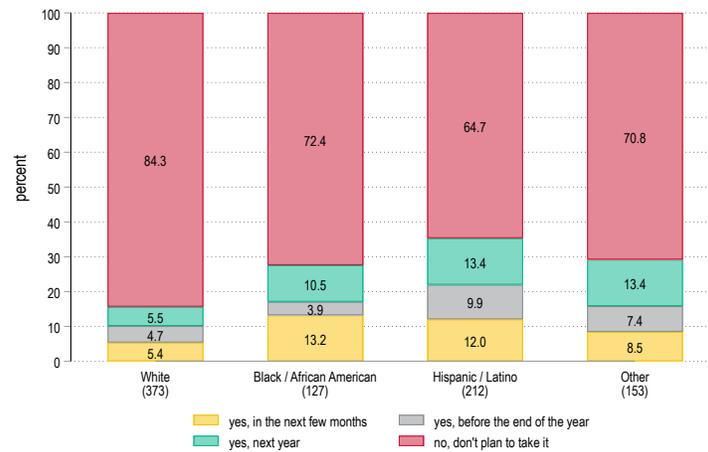

Figure 3.13: Planning to take the COVID-19 vaccine (by race)

Vaccine hesitancy: results from a choice experiment

To analyze more in detail what factors lead to vaccine hesitancy, we conducted a choice experiment (also referred to as a conjoint). Each respondent was asked to choose between two hypothetical vaccine profiles, each with different attributes. Respondents who reported not being vaccinated

were asked to choose which vaccine they would prefer to get, while vaccinated respondents were asked to choose which booster vaccine they would get. Respondents from both groups were also able to select neither option ("*I would prefer not getting the COVID-19 vaccine*").

Each vaccine or booster profile had randomly generated levels for the following attributes: **vaccine technology**, **vaccine approval status**, **vaccine side effects**, and a **monetary compensation** for getting the vaccine. The attributes for **compensation** were *$0, $250, $500*, and *$750.* The attribute **vaccine approval status** offered the following levels: *experimental*, *partially approved*, and *fully approved*. The attribute levels for **vaccine technology** were *protein subunit*, *viral vector*, and *mRNA*. Finally, the attribute **side effects** offered the following levels: *no side effects*, *one day* of side effects, *three days* of side effects, or *five days* of side effects.

In addition to the attributes for each vaccine profile, respondents were also provided information about the level of contagion in their county: whether the spread of COVID-19 in their county was low, moderate, or high. The level of contagion was also randomly assigned for each choice set.

Table 3.1 shows the percentage of times each level of each attribute was chosen among the vaccinated and the unvaccinated respondents across the different levels of contagion. For example, among the vaccinated respondents, $0 compensation was chosen 37.14% of the time it appeared for low contagion levels in the respondent's county, but among the unvaccinated respondents, $0 was chosen 12.53% of the time for high contagion levels. Colors indicate how frequently each level was chosen, going from *green*, when the level was chosen very frequently, to *red*, for those cases selected much less frequently.

	Vaccinated			Unvaccinated		
	Level of contagion in county
	Low	Mid	High	Low	Mid	High
Compensation						
$0	37.14	38.28	33.82	10.95	11.86	12.53
$250	40.17	40.72	39.64	13.29	12.70	14.93
$500	44.53	46.19	45.22	14.93	17.48	17.79
$750	46.31	48.24	49.21	18.21	21.23	17.51
Vaccine Approval Status						
Experimental	29.72	29.72	31.13	9.96	9.88	12.46
Partially approved	42.93	42.64	41.86	15.63	15.19	14.67
Fully Approved	53.46	56.35	55.34	17.41	22.46	20.23
Vaccine Technology						
Protein Subunit	38.95	40.42	39.76	14.46	17.41	16.72
Viral Vector	42.44	42.80	42.62	15.53	15.54	15.86
mRNA	44.76	46.71	46.35	13.13	14.39	14.68
Side Effects						
No side Effects	48.23	50.73	48.21	17.09	19.05	17.63
One day	45.37	44.70	46.11	14.90	17.71	16.44
Three Days	39.07	40.03	41.47	14.61	13.83	15.28
Five Days	35.81	37.59	36.00	11.04	12.45	13.57

Table 3.1: Probability of choosing to get the vaccine by attribute and contagion levels for the vaccinated and unvaccinated

Overall, the levels were selected as expected. Both vaccinated and unvaccinated individuals preferred larger compensations, higher standards of vaccine approvals, and none or milder side effects. We do not see much difference among the different contagion levels in the counties. The largest difference is between the vaccinated and the unvaccinated rather than across levels of contagion. For example, a fully approved vaccine in a context of high contagion was chosen 55.34% of the time among the vaccinated respondents. On the contrary, only 20.23% of the unvaccinated respondents chose this same level under the same level of contagion.

The level that led to more frequent choices was *fully approved* from the attribute **vaccine approval status**, with percentages above 50% for all the levels of contagion among the vaccinated respondents and up to 22.46% among the unvaccinated respondents. The level chosen second most often was the *no side effects* from the **side effects** attribute; the third most chosen level was the *$750* from the **compensation** attribute.

To better understand the conjoint results, we calculated the predicted probabilities of getting the vaccine under the different attribute levels. Figure 3.14 shows the likelihood of getting the vaccine for the respondents who were not vaccinated in exchange for additional compensation, assuming that the vaccine is fully approved, mRNA technology, with one day of side effects. The probability of a non-vaccinated individual getting a vaccine with these characteristics with no compensation is 16%. Once the individual is offered compensation, however, that probability increases to almost

24% in exchange for $750. The probability of choosing to get the vaccine in exchange for $250 and $500 is 18% and 21%, respectively.
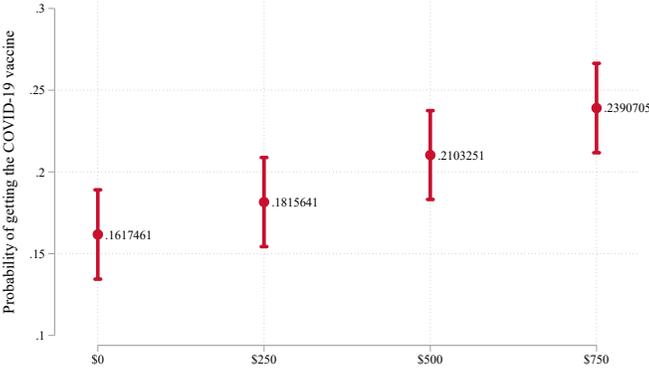

Figure 3.14: Probability of getting the COVID-19 vaccine by level of compensation among unvaccinated respondents

Additionally, we calculated the predictions for unvaccinated people under different approval statuses of the vaccine. For this analysis, we assumed that the vaccine has mRNA technology, with one day of side effects, and with no economic compensation. Under these conditions, the probability of getting the vaccine while in its experimental status is 6.7% (Figure 3.15). Once the approval status is partially approved, the probability of an unvaccinated choosing to get the vaccine increases to 11.1%. The probability further increases to 16.2% once the vaccine has full approval.
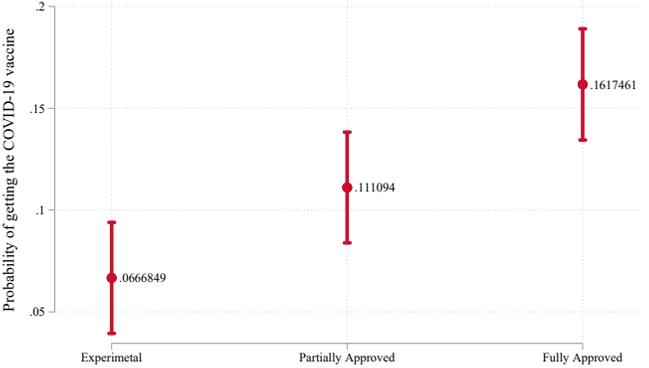

Figure 3.15: Probability of getting the COVID-19 vaccine by vaccine approval status among non-vaccinated respondents

Information about COVID-19 vaccine

To a large degree, a pattern of partisan polarization is evident in the sources that Republicans and Democrats rely on for news about the COVID-19 vaccine.
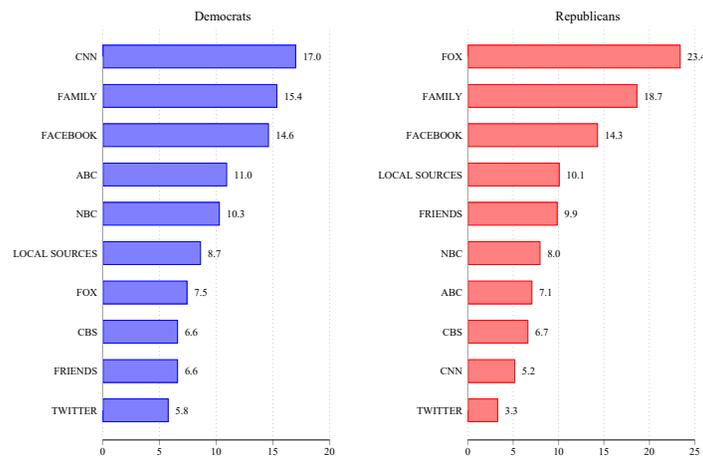

Figure 4.1: Most common responses: Where do you get your information related to the COVID-19 vaccine from? (percentage)

As shown in Figure 4.1, the top three sources for information related to the COVID-19 vaccine are news networks, family, and Facebook. Overall, Republicans get COVID-19 information from a smaller group of sources than Democrats. More than half of Republicans (56.4%) get their information from these three sources with an overwhelming reliance on one source – Fox News (23.4%). Democrats, on the other hand, reported relying on a wider range of sources; 47% of Democrats get their information from the top three sources (cable news network, family, and Facebook), a similar pattern to Republicans but with a reliance on CNN as opposed to Fox News. Among Democrats, we also find slightly higher reliance on other news networks - ABC (11%) and NBC (10.3%) - compared to Republicans (7.1% and 8% respectively).

Interestingly, we find a strong reliance on the Internet as a news source for information on the COVID-19 vaccine among Independents (see Figure 4.2). Forty-seven percent of Independents

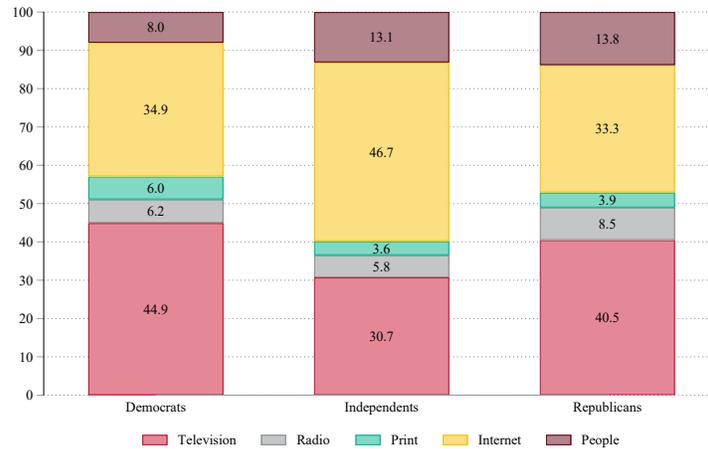rely on the Internet compared to 34.9% of Democrats and 33.3% of Republicans.

Figure 4.2: Which news source do you use the most frequent regarding COVID-19 vaccine information? (by Party)

In addition to frequency of use, the survey also asked about respondents' trust in the respective news sources (see Figure 4.3) as well as levels of importance (Figure 4.4). The results show similar patterns for both trust and levels of importance across the partisan divide. Television was the most trusted news source regarding the COVID-19 vaccine (Figure 4.3) and considered the most essential (Figure 4.4). Democrats and Independents are the most likely to trust television for news on the COVID-19 vaccine, followed by the Internet and people they (family and friends). Similarly, the majority of Democrats and Independents considered television the most essential news source regarding the COVID-19 vaccine, followed by the Internet then people they know. Interestingly, the results present a difference in trust among Republicans. Respondents were more likely to trust people they know (25.6%) more than the Internet (18.4%), yet they consider the Internet more essential for news than friends and family (24.8% and 24.6% respectively).

Figure 4.3: Which news source do you trust the most regarding COVID-19 vaccine information? (by Party)

Figure 4.4: Which news source do you consider the most essential regarding COVID-19 vaccine information? (by Party)

As presented in Figure 4.5, the Internet and television are two primary sources of information on the COVID-19 vaccine. By age group, we find an upward trend in reliance on television sources and a downward trend in reliance on Internet sources as age increases. Younger Texans report most often using the Internet to stay informed about the COVID-19 vaccine.

Figure 4.5 shows that 51.8% of 18 to 29-year-old's rely on the Internet, followed by television (22.8%) and people they know (14.3%). This stands in sharp contrast with older generations, who are instead more likely to turn to television to stay up to date on the COVID-19 vaccine.

Respondents between the ages of 45 and 64 as well as those 65 years or older in general are more likely to rely on television (49.5% and 57% respectively) and less on the Internet (29.9% and 20.8% respectively).
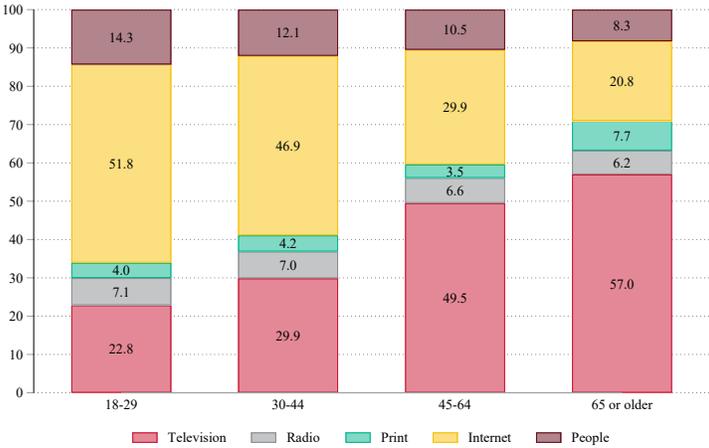

Figure 4.5: Which news source do you use the most frequent regarding COVID-19 vaccine information? (by Age)

As an attempt to connect the respondents sources of information with the accuracy of the information they consume, we asked a question to evaluate the respondents' knowledge of the COVID-19 vaccines. The survey polled respondents on their ability to identify the type (mRNA or viral vector) of each of the three vaccines (see Figure 4.6). We find individuals who report Print media as their most frequent source of information on the vaccine as being the most likely to correctly identify the vaccine type to the trade name. Individuals who most frequently received news from other people they know were the least likely to be able to identify the vaccine type of the Moderna and Pfizer vaccines.
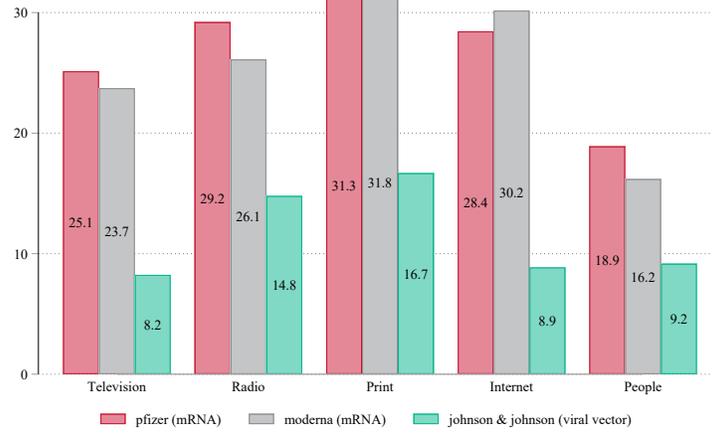
Figure 4.6: Right answer about type of vaccine (by most frequent source of information)

Conclusion

The report presents an analysis from a survey conducted between December 22, 2021, and March 2, 2022, in the state of Texas with an over-sample in the Houston MSA. Results from the evaluation show that COVID-19 vaccine hesitancy is highly polarized. We find several indicators that support this finding. First, respondents' vaccination status correlates with their ideology. While liberals are the most likely type of respondent to be vaccinated against COVID-19, conservatives are the most hesitant regarding the COVID-19 vaccine. Second, when we asked what words came to their mind when they thought about the COVID-19 vaccine, the responses were again polarized, this time among those who got the vaccine and those who did not. The most common answer for those who got the vaccine was "good", while for those who were unvaccinated, the most frequent response was "no". Finally, when the respondent answered about their primary source of information regarding the COVID-19 vaccine, results were different by party identification. While the leading source for Democrats was *CNN*, Republicans get the information on this matter from *FOX NEWS*.

Some programs or initiatives to reduce COVID-19 vaccine hesitancy have involved giving the recipients of the vaccine monetary compensation. We tested the efficiency of those programs among people who were not vaccinated by the date of our survey. We found that offering economic rewards could increase willingness to receive the vaccine by 8%. Additionally, we find that the vaccine approval status matters for the unvaccinated respondents. While a vaccine in *experimental* status would have an acceptance of 6.7%, a vaccine *fully approved* would be accepted by 16% of them.

List of Figures

Appendix

The appendix has tables with descriptive statistics of variables used for this report. The tables presented below have already been weighted.

Table A1: Age categories

	No.	%
18-29	605	23.4
30-44	726	28.1
45-64	827	32.0
65 or older	428	16.5
Total	2,587	100.0

Table A2: race

	No.	%
White	1,048	40.5
Black or African American	296	11.4
Hispanic or Latino/a	844	32.6
Other	399	15.4
Total	2,587	100.0

Table A3: Gender

	No.	%
Male	1,241	48.0
Female	1,287	49.7
Prefer to self-describe	10	0.4
Prefer not to say	49	1.9
Total	2,587	100.0

Table A4: Ideology

	No.	%
Liberals	808	31.2
Moderates	930	35.9
Conservatives	850	32.8
Total	2,587	100.0

Table A5: Party Identification

	No.	%
Democrats	919	35.5
Independents	900	34.8
Republicans	767	29.7
Total	2,587	100.0

Table A6: Do you get the flu shot regularly?

	No.	%
Yes, every year	984	38.1
Most years	484	18.7
Rarely	421	16.3
Never	698	27.0
Total	2,587	100.0

Table A7: Have you received the COVID-19 vaccine?

	No.	%
Yes, 2 or more doses Pfizer or Moderna	1,244	48.1
Yes, at least one dose of J&J	208	8.1
Yes, one dose of Pfizer or Moderna	146	5.6
No	934	36.1
Fully vaccinated with another vaccine	45	1.8
Partially vaccinated with another vaccine	9	0.3
Total	2,587	100.0

Table A8: Did you receive economic compensation for getting the COVID-19 vaccine?

	No.	%
Yes	276	15.8
No	1,464	84.2
Total	1,740	100.0

Table A9: Do you plan to take the COVID-19 vaccine

	No.	%
Yes, in the next few months	80	9.2
Yes, before the end of the year	60	6.9
Yes, next year	88	10.2
No, I do not plan to take it	638	73.7
Total	865	100.0

Table A10: Would you get a third dose or booster of the COVID-19 vaccine?

	No.	%
Yes	933	54.2
No	309	17.9
I already received booster	481	27.9
Total	1,722	100.0